



# Influenza

INFORMATION AND NEWS ON INFLUENZA

## EDITORIAL

In the last bulletin, ESWI announced a new policy plan, which we have already begun to implement. It is an ambitious plan, which ESWI wants to communicate as widely as possible.

The plan begins with a redefinition of ESWI's strategic objective, first defined in 1997. 'To reduce the impact of influenza' is still the core message, but it is now more detailed: 'to reduce the impact of epidemic and pandemic influenza in Europe by optimising the ways to combat the disease'. ESWI has translated this global objective into manageable operational goals with the aim of achieving clear end results.

ESWI wants to convince policy makers that increasing awareness of the impact of the disease and the possibilities for control will help improve surveillance of vaccine use.

Along with other organisations, we aim to have:

- an improved public prevention policy
- better communication about vaccines, antiviral products and surveillance activities
- pandemic preparedness plans in more countries
- better use of vaccines and antiviral products.

It must be clear that ESWI does not want to limit information only to the scientific and medical world. It is ESWI's task to raise awareness of the impact of influenza and its control among health policy officials, opinion leaders in public

health, healthcare workers, employers and the general public.

The policy plan lists the activities needed to reach the goals we have set. There are already established communication lines with key policy makers in Europe. We will send them a twice-yearly newsletter with news on disease control strategies from countries or regions in Europe. The First European Influenza Conference in Malta, not only attended by scientists but also by policy makers and journalists, was covered in leading European newspapers.

*... communication about influenza is a core activity and national experts have an important role.*

Given our strategic objectives, communication about influenza is a core activity and national experts have an important role. They can promote vaccination and help to control influenza more directly and effectively. Therefore, ESWI wants to collaborate with existing national influenza organisations for maximum effectiveness in preventing and controlling influenza. Pilot projects in Sweden, Germany and Poland will be established.

ESWI's defined task is to manage the organisational aspects and processes of the plan. In the future, it will be important to review this process regularly and ask what have we achieved? What has changed? Do we need to adapt?

ESWI is counting on the collaboration of all parties to realise the plan. ESWI wants to be the 'tool' for mobilising the public sector, business and society, in raising awareness of the impact of influenza. By using the specific skills and interests of all partners, together we will reduce the impact of influenza in Europe.

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## THE FIRST EUROPEAN INFLUENZA CONFERENCE, 23–27 OCTOBER, 2002, MALTA

ESWI organised the First European Influenza Conference on 23–27 October, 2002, in Malta, to celebrate its 10th anniversary. Although Malta is not yet part of the European Union (EU) it was selected for its pleasant climate and rich, ancient history. This conference was an opportunity for scientists from Europe and other parts of the world to meet and exchange information and ideas on influenza. It was also a chance to measure the evolution of influenza's image in the last few years not only from the scientific community's point of view, but also the international institutions'.

The opening session was a chance to hear statements from EU and World Health Organization (WHO) representatives on the medical, social and economic consequences of 'normal' annual outbreaks of influenza and the dramatic pandemics that we are still not properly prepared for. The WHO's global agenda on influenza is an essential step in solving the difficult problems of epidemiology, vaccine policies and antiviral evaluations. Pandemic planning, along with national and international emergency planning, is one of the most crucial issues today. Some national institutions are still not sensitive to this, but it was encouraging to see several decision makers from different countries at the conference.

As expected, the quality of the scientific programme was high. This was because of the participants and also because in several fields, from pandemic history to basic molecular epidemiology, more information is being collected, faster than ever. The only concern was that the programme was so full that it was sometimes difficult to decide which parallel session to attend.

Almost 600 delegates attended the meeting. They communicated in five plenary sessions and 10 parallel workshops on all aspects of influenza research from the clinical to virology, epidemiology and economics. The major presentations will be published in the next 6 months and will take a privileged place on the library shelves next to four other volumes on the 'Options for the Control of Influenza' meetings.

Database tutorials were another remarkable initiative to help scientists become familiar with modern communication techniques. The support from industry was welcome. Vaccine or drug manufacturers organised four satellite symposia to introduce and evaluate recent research and new products. There were a number of working group meetings and this newsletter reports on all the major aspects of the meeting.

ESWI decided to mark its anniversary with a gift to a charity: €10,000 were donated to the Maltese Red Cross to help its humanitarian actions.

ESWI was also proud to help 27 young scientists who wanted to present their results but did not have the funds. Two of them received awards for the best oral and poster presentations (see pages 5 and 6).

The venue for the gala dinner, the palace of the Knights of Malta, was symbolic of efforts to combat diseases through the ages and was a source of inspiration for ESWI's goal: to reduce the impact of influenza.

Due to a change of date by the Japanese organisers, the interval between influenza conferences is shorter than planned, just 1 year, and the next Options meeting will be in October 2003 in Okinawa, Japan. We trust that with rapid progress in influenza treatments, there will be plenty of new results and concepts in 2003. We will then have to decide if the influenza conference is to be quadrennial on odd years.

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## DATABASE TUTORIALS IN MALTA

As part of ESWI's commitment to influenza in public health and research, we held a series of database tutorials at the First European Influenza Conference in Malta.

We decided to run these tutorials after discovering that people find the databases very useful if they have the chance to sit down with an expert and see what they can do.

Feedback from the Malta tutorials was very good. Ninety-six per cent of those who filled in the feedback form rated the tutorial as 'useful' or 'very useful'. A similar percentage rated the quality of the instruction as 'good' or 'very good', and all said 'yes' or 'definitely' that the tutorials should be repeated at future conferences.

Before the meeting started, there were 126 registrations for the tutorials, including those on the waiting list for sessions that were already full. We limited the numbers

for each tutorial to 12 so that participants got lots of help from the instructors, and so that there were at most, two per computer.

There were 13 tutorials each lasting from 1–1½ hours. They ran concurrently with the scientific part of the conference, from Monday morning to Wednesday lunch. The tutorials covered the European Influenza Surveillance System (EISS) (Koos Van der Velden and John Paget), EuroGROG (Jean-Claude Manuguerra), FluNet (Nikki Shindo), and the Influenza Sequence Database (Catherine Macken and David McDonald). The tutorials in high demand were given two or three times during the conference.

There were two tutorials each on EISS, EuroGROG and FluNet, and seven on the sequence database. The sequence of database tutorials covered searching, viewing, downloading alignments, and phylogenetic trees (the novice tutorial); picking primers,

locating cytolytic T lymphocyte epitopes, and visualising three-dimensional structures (the intermediate tutorial), and using private compartments in a password-protected domain (the advanced tutorial).

As well as being a way of learning about the databases, the tutorial gave the users the chance to pass on ideas for improving the databases.

Our thanks go to the instructors, to Jans Velzing from JaDes Internet and Automation for website support and last, but certainly not least, to Anne Marie De Block for organising the tutorials.

There was no fee to attend the tutorials because of generous financial support from Wyeth.

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## EPIDEMIOLOGY IN ELDERLY PEOPLE

Influenza and pneumonia together are the fourth leading cause of death, and among the most common causes of catastrophic disability, in people aged 65 and above [1]. In England and Wales each year an average of 422,000 extra people are diagnosed with influenza-like illness during the epidemic period; among 1.1 million extra people present with acute respiratory infections. There were 3,028 excess respiratory hospital admissions (England only) in the age group 65–74 years and 6,049 who were aged over 75 years. An average of 12,554 deaths occur in England and Wales during influenza epidemic periods each year [2].

The Swiss Sentinel Network (SSN) has monitored influenza activity in Switzerland since 1986. Between 2,600–6,600 cases of influenza-like illness are reported each season, based on this there are an estimated 100,000–230,000 cases in Switzerland each year. Among patients over 60 years 13–20% develop pneumonia and 1.3–2.7% are

hospitalised, this represents an estimated 1,800 hospitalisations caused by influenza each year [3]. In Austria, in 1990, 49.34/100,000 patients with influenza were admitted to hospital for treatment, costing nearly €8 million [4].

Although these rates are highly variable from one season to the next [5], 80–90% of the serious morbidity and mortality from influenza is among older people. H3N2 strains of influenza A cause the most severe illness in older people: influenza is virtually absent in this group when H1N1 strains circulate [6]. This phenomenon has been attributed to 'original antigenic sin'. Influenza B strains cause more modest disease in older people but it can be significant in nursing homes [7].

Influenza vaccination is recommended for everyone aged 65 and above in most developed countries. Current vaccines are 50–60% effective in preventing influenza [8]

although protection rates may vary among institutionalised older adults [9,10]. Vaccination programmes save money largely because they reduce hospital admissions of older adults with chronic heart or lung disease. But even low-risk older adults benefit from the 30–40% reduction in hospital admissions from influenza vaccination [11–13]. Respiratory syncytial virus, [14,15] and possibly other respiratory viruses, circulate at the same time as influenza and cause clinically identical illnesses in older people. These are not prevented by vaccination and help reduce vaccine effectiveness. Recent epidemiological studies showed a link between influenza vaccination and a 50% reduction in myocardial infarction, sudden cardiac death [16,17] and stroke [18] during the influenza season, suggesting vaccination has other benefits for older people.

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## GLOBAL AGENDA ON INFLUENZA

In May 2002, the World Health Organization (WHO) published a 'Global Agenda on Influenza', prepared with help from everyone involved in influenza surveillance and prevention\*. This agenda is a strategic 'roadmap' with long-term priorities for reducing morbidity and mortality from annual influenza epidemics and preparing for the next pandemic. The Global Agenda gives impartial guidance on research and development and national/global action for controlling influenza. It can also be used to support advocacy and fundraising and as a technical foundation for international collaboration and partnership.

What is the WHO's role in implementing the Global Agenda? The WHO will focus on 'what it can do best', as its Director-General Dr Gro Harlem Brundtland pointed out, including specific components of the Global Agenda's priority areas (surveillance, burden

of disease, vaccines and pandemic preparedness). In the past few months, the WHO has set up a working group to assess the burden of influenza in developing countries. It will meet in January 2003 to develop studies in at least four developing countries. It has also published\* an assessment of the 100+ national influenza centres which are the foundation of the WHO global influenza surveillance network. The data from this assessment, which are part of the WHO action plan for strengthening its surveillance, are due in early 2003. There is also a new WHO manual on diagnosis and surveillance of influenza, which will be published in early 2003. Guidelines on the use of vaccines and antivirals during influenza pandemics\* were published in October 2002. Besides recommendations on the composition of influenza vaccine in February and September 2003, the WHO will also hold the first Global Forum on Influenza in

2003. The forums are a chance for the key players in influenza to review and share information. These meetings should help to develop global strategies, stimulate political commitment and increase financial investment in influenza. They should also support coordination of national and regional action in influenza surveillance and control. They should be platforms for discussing international collaboration, advocacy and social mobilisation.

Finally, the meetings should support tracking, coordination and advocacy of activities in the Global Agenda. The first Global Forum on Influenza is during the Options for the Control of Influenza V Conference in October 2003.

\*see: [www.who.int/influenza](http://www.who.int/influenza)

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## RECOMMENDATIONS AND GUIDELINES PROJECT

During the 1990s, elderly people aged over 65 were added to the at-risk groups for influenza in many European countries. The discussion has now begun on lowering the age to 60 or even 50 years. Many at-risk patients are as young as 50 and patients and their doctors are often not aware of the risk. Children under the age of 2 years also seem to be at higher risk of hospital admission for influenza and pneumonia during the influenza season.

Vaccination rates in Europe vary greatly, even though most have the same age criterion. Differences in health care structures and arrangements for reimbursement are major causes of variation. Implementation of vaccination programmes also seems to differ between countries. Monitoring vaccine use gives feedback to doctors on vaccination campaigns. The vaccination rate needs to improve further if we are to be prepared for the next pandemic.

The aim of the ESWI recommendations and guidelines project was to update information and to develop an accurate and timely system of reporting directly from the manufacturers. We sent questionnaires to representatives of vaccine manufacturers in 29 countries, asking for numbers of influenza vaccines shipped to each country. We asked for data from the three last seasons

(1998/1999, 1999/2000 and 2000/2001). For privacy reasons the data were sent to an independent scrutineer in Antwerp, Belgium, where the data were put together for each country.

### Recommendation

All countries considered that everyone aged 65 years and above was at risk. In Austria and Germany the threshold is 60 years and over. Belgium advisers recommended immunising everyone aged 50 years and above, like the USA. No European country mentioned children under a certain age as a high-risk group.

There were hardly any differences among countries for the main high-risk conditions like cardiovascular and respiratory disease, diabetes, and renal or immunological problems. Not all countries mentioned HIV or long-term aspirin treatment in children as a special risk. They varied greatly over other target groups like nursing home residents, health-care personnel and household contacts of at-risk people. Only two countries mentioned pregnancy as a specific risk, and only three advised vaccinating healthy workers.

Eight out of 29 countries had recommendations on antivirals. Only four countries

differentiated between the neuraminidase inhibitors and older antivirals.

### Vaccine usage

European countries vary in their use of vaccines. In Western Europe, it is between 95 and 197 per 1000. In Central and Eastern Europe it is between 1 and 78 per 1000. In most countries, especially in Eastern Europe, there has been a gradual increase over the three seasons, except in Scandinavia.

### Conclusion

The recommendations for influenza immunisation hardly differ among European countries. The differences in vaccine use in Western Europe are not due to differences in recommendations or economic wealth. Perhaps the attitude to prevention differs among countries. It might be worth using lots of different strategies. We need precise data on vaccine use to monitor ways of improving influenza immunisation. ESWI's system could be used worldwide.

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## YOUNG SCIENTIST AWARD – BEST PRESENTATION



Mayte Coiras was one of the recipients of the Young Scientist Award for the best oral presentation. She won a prize of €1000, at the recent ESWI conference in Malta (see also page 6).

I am currently a Postdoctoral Research Fellow at the Virology Service, National Centre for Influenza (the World Health Organization: Influenza Surveillance Programme), National Centre for Microbiology, Instituto de Salud Carlos III (Majadahonda, Madrid, Spain).

I was previously a Research Fellow of the Immunology Division at the Microbiology Department, Faculty of Pharmacy (Universidad Complutense de Madrid, Madrid, Spain) where I obtained my PhD.

At the First European Influenza Conference in Malta, I presented the main focus of my work: the design and standardisation of new ways of detecting, identifying and characterising type and/or subtype respiratory viruses using molecular methods such as RT-PCR

and specific hybridisation. Because different viruses cause infectious respiratory diseases with shared clinical syndromes resembling influenza, virological diagnosis is needed to find the etiology of the infection. We proposed a method of reverse line blot hybridisation that could detect the most important respiratory viruses in the clinical specimen. Hybridising the nucleic acids from the clinical sample to multiple specific oligonucleotides is an accurate, cheap, easy, and rapid way of detecting and typing various respiratory viruses. So it is useful not only in routine diagnosis but also in epidemiological studies.

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## INFLUENZA A H1N2 VIRUSES

Although influenza activity was low to moderate from September 2001–February 2002, the season was notable for the isolation of reassortant influenza A H1N2 viruses from outbreaks or sporadic cases in 20 different countries in Europe, Africa, Asia and the USA [1]. Influenza A H1N2 viruses have been isolated from humans in the past. From 1988–1989, several H1N2 viruses were isolated in six cities in China, but these reassortant viruses did not spread to other countries [2,3].

### Characterisation of H1N2 viruses

Analysis of H1N2 viruses showed that the haemagglutinin (HA) is antigenically and genetically similar to that of contemporary A/New Caledonia/20/99-like H1N1 viruses. The neuraminidase (NA) is antigenically and genetically similar to the NA of recent A/Moscow/10/99-like H3N2 viruses. Each of the six internal genes was derived from recent H3N2 viruses. It is likely that H1N2 viruses came from genetic reassortment between recently co-circulating H1N1 and H3N2 viruses, at some time between 1999 and 2001. The earliest H1N2 viruses (identified retrospectively) were isolated in March 2001, in the UK and Saudi Arabia [4,5] and in India in May 2001 [6].

### Influenza H1N2 virus activity in the UK

More than 200 H1N2 viruses were isolated in the UK between September 2001–March 2002. H1N2 viruses co-circulated with about the same number of H3N2 viruses,

fewer influenza B viruses and very few H1N1 viruses [7]. Although H1N2 viruses were as prevalent as H3N2 viruses during the winter in the UK, there were low levels of clinical influenza-like illness activity [7], indicating that the new H1N2 subtype was not linked to particularly severe influenza-like illness (ILI) activity. More than 75% of H1N2 isolates were from children under 15 years, with very few isolates from adults (including those over 65), suggesting that young people are the most susceptible, possibly with a primary infection.

### Implications for prevention, control and diagnosis of H1N2 virus infection

Since the HA and NA components of H1N2 viruses are antigenically similar to those of the recommended H1N1 and H3N2 vaccine strains, the current influenza vaccine is expected to give good protection against reassortant H1N2 viruses [8]. Preliminary studies of representative H1N2 viruses show that they are susceptible to amantadine [5] and the NA inhibitors, zanamivir and oseltamivir [6]. The emergence of the new H1N2 subtype highlights the need to characterise both the HA and NA of influenza A viruses. Since few laboratories characterise the NA with NA inhibition assays, subtyping can be done with NA-specific PCR assays [5,6].

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## YOUNG SCIENTIST AWARD – BEST POSTER



Jan Kyncl, the other winner of the Young Scientist Award, receives his prize for the best poster from Professor Osterhaus.

I have national responsibility for the Czech Republic's acute respiratory infection (ARI) reporting system. I have been based at the National Institute of Public Health in Prague since 1998. In 2002, I spent 3 months on a fellowship at the Public Health Laboratory Service Communicable Disease Surveillance Centre, London. My work, 'Improving the acute respiratory infection

notification system in the Czech Republic', details substantial changes in the ARI reporting system from 2000–2002. From the 2001/2002 season onwards, each District Public Health Service put data from collaborating general practitioners and paediatricians onto a central database, using an encrypted web transfer with name and password controlled access. The basic data

processing is automated. It uses a statistical model to detect unusual increases in indicators, based on a general linear model for censored data. Usual weekly ARI incidence is modelled and this can only increase if there is an epidemic. A threshold was established, non-epidemic ARI incidences from previous years were averaged and an upper tolerance limit applied. Direct standardisation and weighting for the size of the monitored population were also used to compare ARI morbidity among regions.

The improved ARI notification system of the Czech Republic collects high quality data in a modern and efficient way. An internet-based platform makes it easily accessible, giving up-to-date information. Regular weekly outputs are available at [www.szu.cz/cema/aro/aro.htm](http://www.szu.cz/cema/aro/aro.htm) or by clicking on a map at the European Influenza Surveillance Scheme (EISS) web site ([www.eiss.org](http://www.eiss.org)).

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## INFLUENZA VACCINE STRAINS FOR THE 2003 SOUTHERN HEMISPHERE SEASON

In September 2002, the World Health Organization (WHO) made its annual consultation on the composition of influenza vaccines for the southern hemisphere. This is a summary of the data and vaccine recommendations for the 2003 season [1].

### March – September 2002 influenza activity

Influenza A (H1N1) and A (H1N2) viruses circulated in many countries, although their prevalence decreased. Most isolates had haemagglutinin proteins that were antigenically similar to the previous vaccine strain, A/New Caledonia/20/99. H1N2 viruses were the result of genetic reassortment between recent human H1N1 and H3N2 viruses.

Influenza A (H3N2) viruses circulated widely, causing outbreaks in several countries. Most isolates were antigenically similar to A/Moscow/10/99 and the previous vaccine strain, A/Panama/2007/99. Although some isolates were antigenically distinguishable from these strains, there was no representative variant. Influenza B viruses also circu-

lated widely, causing outbreaks and sporadic cases. Most of these viruses were closely related antigenically to B/Hong Kong/330/2001, although some B/Sichuan/379/99-like viruses were also isolated. Most B/Hong Kong/330/2001-like viruses were reassortants, with neuraminidases that resembled those of B/Sichuan/379/99.

### Vaccine studies

Vaccines containing A/New Caledonia/20/99 (H1N1), A/Panama/2007/99 (H3N2) and B/Shangdong/7/97 (B/Hong Kong/330/2001-like) strains stimulated satisfactory antibody responses to recent influenza A (H1N1), A (H1N2), A (H3N2) and B strains.

### Vaccine composition

The WHO recommended including the following influenza strains in southern hemi-

sphere vaccines for the 2003 season:

- an A/New Caledonia/20/99 (H1N1)-like strain
- an A/Moscow/10/99 (H3N2)-like strain\*
- a B/Hong Kong/330/2001-like strain.\*\*

\*The widely used vaccine strain is A/Panama/2007/99

\*\*Some currently used vaccine strains are B/Shangdong/7/97, B/Hong Kong/330/2001 and B/Hong Kong/1434/2002

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### Reference

1. Recommended composition of influenza virus vaccines for use in the 2003 influenza season. *Wkly Epidemiol Rec* 2002; 41: 344–348.

## PANDEMIC VACCINES

Although inactivated influenza vaccines are used every year in most of the developed world, there is increasing concern that we are ill-prepared to protect ourselves against pandemic influenza. The problems can be separated into:

- vaccine availability
- vaccine efficacy.

### Vaccine availability

It may take 7–8 months (or more) to develop a pandemic influenza vaccine. This is due to initial safety fears, possible delays in developing a productive seed virus from a novel influenza virus, lack of reagents to measure vaccine potency and problems with licensing a possibly new formulation [1] (see later). It is a sobering thought that there is still no satisfactory H5N1 vaccine seed virus, 5 years after the Hong Kong 'chicken flu' outbreak. But there is more optimism for the future.

Many key influenza laboratories in the world now have biological containment. Reverse genetics technology is gradually being adapted for vaccine seed development. There are also plans for libraries of seed viruses and potency reagents for different influenza subtypes, and the authorities are beginning to discuss emergency licensing of pandemic vaccines.

### Vaccine efficacy

The immunogenicity and efficacy of influenza vaccines is well established. But it is likely that in a pandemic, when large sections of the community are immunologically naïve, conventional vaccines will not be effective. During the 1976 H1N1 'swine flu' vaccine trials, a single conventional vaccine dose of 15µg haemagglutinin (HA) did not stimulate protective levels of immunity in young naïve people [2,3]. Two doses were needed. This happened again in 2000, when an H5N3 subunit vaccine was assessed in a Phase I study. In this case even two vaccine doses barely protected [4]. However it was encouraging that an MF59 adjuvant considerably enhanced the immune response to the H5N3 vaccine. So from current evidence it seems that two vaccine doses would be needed in a pandemic, possibly with an adjuvant. It is important to evaluate the immunogenicity of conventional and adjuvanted vaccines from other avian subtypes, to prepare a pandemic vaccination strategy.

### Conclusion

The World Health Organization has a Global Agenda [5] (also see page 4), with key actions for meeting the threat of pandemic influenza. We have had warnings of possible pandemics, first in 1997 with the H5N1 virus transmitting to man and 2 years

later with H9N2 virus infections. It is important to heed these warnings and take action so that we are better prepared.

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## HUMAN METAPNEUMOVIRUS

About a year ago, human metapneumovirus (hMPV) was first discovered in young children in The Netherlands with acute respiratory illness (ARI), ranging from mild upper respiratory tract disease to severe bronchitis and pneumonia [1]. From virological data, sequence homology and gene constellation, hMPV was characterised as the first mammalian member of the recently assigned genus *Metapneumovirus*. Up till then, avian pneumovirus was the sole member [1,2]. Nearly all children in The Netherlands have been infected with this virus by the age of 5 years, according to a serological survey [1].

Serological studies also showed that hMPV must have been circulating in The Netherlands for at least half a century. hMPV has now been found in patients with respiratory illness all over the world, including several European countries, the

Americas, Asia and Australia [3]. It was not only found in children with ARI, but also in elderly and immunocompromised patients. The overall clinical symptoms and signs of hMPV infection appear similar to those of RSV in these patient groups. Interestingly, the virus was virtually absent in clinically healthy people, showing that asymptomatic and sub-clinical infections are rare. RT-PCR-based assays are the chosen method for identifying hMPV along with virus isolation which is proving rather difficult (hence the late discovery of the virus).

Other diagnostic methods are also being developed. hMPV is a ubiquitous and important respiratory pathogen, clearly distinct from RSV. However, its clinical impact and the disease it causes are quite similar to those caused by RSV infections. The overall burden of disease from hMPV needs further study.

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## CALENDAR OF EVENTS

DATE/VENUE	TITLE	ORGANISER/SECRETARIAT
9–11 January 2003 Lisbon, Portugal	Annual Winter Meeting of the European Society for Clinical Virology	Dr Madalena Magalhaes Sociedade Portuguesa de Virologia Rua Fialho de Almeida nr. 10, 3 <sup>o</sup> andar Lisboa 1070-129 Portugal Tel: +351 1919 796 679 Fax: +351 21 8 473 746
12–15 January 2003 Venice, Italy	4th International Symposium Perspectives in Clinical Microbiology and Infections	Professional Conference Organiser EAC s.r.l. Via Sannio 4-20137 Milan Italy Tel: +39 02 5990 2320 Fax: +39 02 5990 0758
27 April–1 May 2003 Savannah, USA	16th International Conference on Antiviral Research	Courtesy Associates 200 L Street NW Suite 710 Washington, DC 20036 USA Tel: +1 202 973 8690 Fax: +1 202 331 0111
10–13 May 2003 Glasgow, Scotland	13th European Congress of Clinical Microbiology and Infectious Diseases	13th ECCMID 2003 c/o AKM Congress Service PO Box CH-4005 Basel CH-4005 Switzerland Tel: +41 61 686 7711 Fax: +41 61 686 7788
26–30 May 2003 Florida, USA	Pediatric Infectious Disease	American Medical Seminars Inc. PO Box 6129 Sarasota 34278 USA Tel: +1 941 388 1766 Fax: +1 941 365 7073
28–30 July 2003 London, UK	International Conference on Viral Vaccines	John Herriot Viral Vaccines 2003 Secretariat Meetings Management The Barn Rake Meadow Station Lane Milford, GU8 5AD UK Tel: +44 (0) 1483 427 770 Fax: +44 (0) 1483 428 516
24–28 August 2003 Lyon, France	6th Annual Meeting of the European Society for Clinical Virology	Package Organisation 132–140 cours Charlemagne Lyon 69002 France Tel: +33 4 7277 4550 Fax: +33 4 7277 4577

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